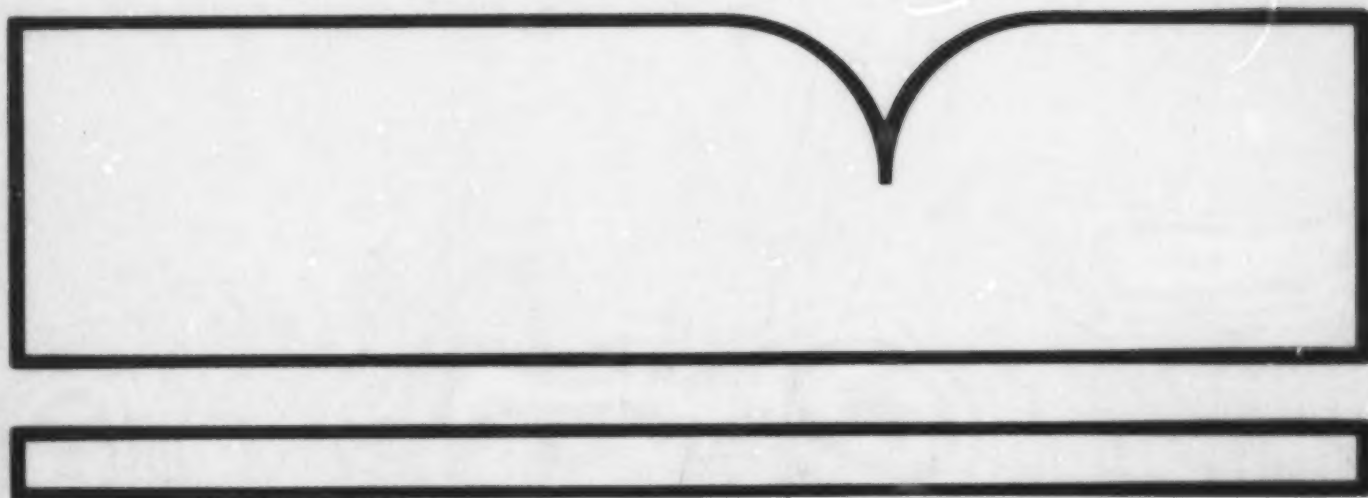


PB87-112256

Pesticide Fact Sheet Number 23
Simazine Standard

(U.S.) Environmental Protection Agency
Washington, DC

30 Mar 84



U.S. Department of Commerce
National Technical Information Service
NTIS

REPORT DOCUMENTATION PAGE		1. REPORT NO.	2.	PB87-112256	
4. Title and Subtitle EPA Pesticide Fact Sheets - SIMAZINE No. 23				5. Report Date Issued 3/30/84	
7. Author(s) EPA, Office of Pesticide Programs, Registration Division				6. Performing Organization Rept. No. 540/FS-87- 093	
9. Performing Organization Name and Address US Environmental Protection Agency Office of Pesticide Programs Registration Division, TS-767C 401 M Street, S.W. Washington, D.C. 20460				10. Project/Task/Work Unit No.	
12. Sponsoring Organization Name and Address Same as #9				11. Contract(C) or Grant(G) No. (C) (G)	
				13. Type of Report & Period Covered	
				14.	
15. Supplementary Notes					
16. Abstract (Limit: 200 words) This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred. 1. Issuance or reissuance of a registration standard, 2. Issuance of each special review document, 3. Registration of a significantly changed use pattern, 4. Registration of a new chemical, or 5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.					
17. Document Analysis a. Descriptors Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, Science Findings b. Identifiers/Open-Ended Terms REPRODUCED BY U.S. DEPARTMENT OF COMMERCE NATIONAL TECHNICAL INFORMATION SERVICE SPRINGFIELD, VA. 22161 c. COSATI Field/Group					
18. Availability Statement: Publicly Available			19. Security Class (This Report) Unclassified		21. No. of Pages 5
			20. Security Class (This Page) Unclassified		22. Price



Pesticide Fact Sheet

Name of Chemical: SIMAZINE STANDARD
Reason for Issuance:
Date Issued: March 30, 1984
Fact Sheet Number: 23

1. Description of the chemical

- Generic name: 2-chloro-4,6-bis(ethylamino)-s-triazine
- Common name: Simazine
- Trade names: Algae-A-Way, Algaecide, Algidize, Algi-ester, Algi-gon, Anizine, Aquazine, Atomicide, Cekusan, Cinecide, Framed, Gesapun, Gesatop, Primatol S, Princep, Simadex, Simenex, and Sim-trol.
- EPA Shaugnessy Number: 080877
- Chemical Abstract Service Registry Number (CAS) 122-34-9
- Year of initial registration: 1957
- Pesticide type: Herbicide
- Chemical family: Triazine
- U.S. & foreign producers - Ciba-Geigy Corporation, Griffin Corporation, Aceto Chemical Company, Inc., Drexel Chemical Company, and Vertac Chemical Company

2. Use patterns and formulations

- Application sites: Simazine is registered for use as a selective or nonselective herbicide and algaecide. It is registered for use on agricultural, noncrop, forest and aquatic sites.
- Types of formulations: Wettable powder, granular, liquid, flowable concentrate, soluble concentrate, dry flowable and liquid-ready to use
- Types and methods of applications: Broadcast, band, soil incorporated, and soil surface application using ground or aerial equipment. The specific method of application and type of equipment are determined by site, formulation, and equipment availability.
- Application rates: 1.6 lbs. a.i./A to 9.6 lbs. a.i./A, generally 4 lbs. a.i./A.
- Usual carrier: Water, oil, and clay

3. Science findings

Chemical characteristics:

- Simazine is a white, odorless, crystalline solid. It is stable to heat and the melting point is 225-227 C. Simazine is nonflammable and does not present unusual handling characteristics. Storage stability is greater than three years at room temperature under dry conditions.

Toxicological characteristics:

- Simazine is a moderate eye and dermal irritant (Toxicity Category III,

- and has low oral and dermal toxicities (Toxicity Category IV).
- There are no data available for inhalation toxicity (A Data Gap exists for this requirement).
 - Toxicology studies on simazine are as follows:
 - Oral LD50 in rats: > than 15,380 mg/kg body weight
 - Dermal LD50 in rats: 10.2 mg/kg body weight.
 - Inhalation in rats: No data available for review.
 - Skin Irritation in rabbits: Slight irritant
 - Eye Irritation in rabbits: 5 test animals after 72 hours showed moderate irritation which was reversible in 7 days. No corneal opacity was observed.
 - Teratology in rats: No data available for review. A data gap exists for this requirement in 2 species.
 - Three-Generation Reproduction Study in rats: The reproduction NOEL is > 100 parts per million (ppm). No adverse effects on reproductive performance in rats at a dietary level of 100 ppm for three generations over a total study period of 93 weeks.
 - Chronic feeding/oncogenicity in rats: Chronic toxicity and oncogenic potential could not be determined in this study. A data gap exists for oncogenic or chronic toxicity in the rodent (rat).
 - Chronic feeding in dogs: Neither chronic toxicity nor oncogenic potential could be determined from this study. A data gap exists for the chronic toxicity in non-rodents (dogs).
 - Oncogenicity in mice: An oncogenicity study in a second species is required.
 - Mutagenicity: Mutagenicity studies were not available for review. Data gaps exist for the entire category of mutagenicity testing required for registration.
 - General Metabolism: A data gap exists for a required general metabolism study which identifies and quantitates metabolites formed in the exposure of the mammalian species.

Physiological and biochemical behavioral characteristics:

- Foliar absorption: Absorbed mostly through plant roots with little or no foliar penetration. It has low adhering ability and is readily washed from foliage by rain.
- Translocation: Following root absorption it is translocated acropetally in the xylem, accumulating in the apical meristems and leaves of plants.
- Mechanism of pesticidal action: A photosynthetic inhibitor; but may have additional effects.
- Metabolism and persistence in plants: Simazine is readily metabolized by tolerant plants to hydroxysimazine and amino acid conjugates. The hydroxysimazine can be further degraded by dealkylation of the side chains and by hydrolysis of resulting amino groups on the ring and some CO₂ production. These alterations of simazine are major protective mechanisms in most tolerant crop and weed species. Unaltered simazine accumulates in sensitive plants, causing chlorosis and death.

Environmental characteristics:

- Adsorption and leaching in basic soil types: Simazine is more readily adsorbed on silt or clay soils than in soils of low clay and organic matter content. The downward movement or leaching of simazine is limited by its low water solubility and adsorption to certain soil constituents. Tests have shown that for several months after surface application the greatest portion will be found in the surface 2 inches of soil. It has little if any lateral movement in soil but can be washed along with soil particles.
- Microbial breakdown: Microbial breakdown is one of several processes involved in the degradation of simazine. In soils, microbial activity possibly accounts for decomposition of a significant amount of simazine.
- Loss from photodecomposition and/or volatilization: Under normal climatic conditions, loss of simazine from soil by photodecomposition and/or volatilization is considered insignificant.
- Bioaccumulation: Simazine has a low potential to bioaccumulate in fish.
- Resultant average persistence: The average half-life of simazine under anaerobic soil conditions is greater than 12 weeks. The half-life of simazine under aerobic soil conditions is 8 to 12 weeks. The persistence of simazine in ponds is dependent upon many factors including the level of algae and weed infestation. The average half-life for simazine in ponds is 30 days.

Ecological characteristics:

- Avian oral LD50: > 4640 mg/kg (practically non-toxic)
- Avian dietary LC50: 2000 ppm to 11000 ppm (moderately to slightly toxic)
- Fish LC50: 6.4 to 70.5 ppm (moderately to slightly toxic)
- Aquatic invertebrate LC50: 3.2 to 100 ppm (moderately to slightly toxic)
- The use of simazine could affect endangered aquatic species only if there was a direct application to the water where they dwell. Terrestrial endangered species may be affected, particularly for such uses as ditchbanks and rights-of-way. Formal consultation with the Office of Endangered Species, USFWS may be initiated.

Tolerance assessments:

- Tolerances have been established for simazine in a variety of food and forage crops, meat and poultry, milk and dairy products, and shellfish. The Agency has reevaluated the existing data base which revealed significant deficiencies. Evaluation of acute toxicity data did not reveal any adverse acute effects of simazine. Data are either lacking or insufficient to determine long-term chronic effects, oncogenicity potentials, teratogenicity and mutagenicity. These data are crucial and necessary for the continuation of existing tolerances and for the consideration of additional tolerances. The information specifying sameness or differences between metabolites formed in plants and animals is also necessary.

Problems which are known to have occurred with use of simazine:

- The files of the Pesticide Incident Monitoring System (PIMS) indicate 71 incidents involving simazine during the period 1966 to June 1981. Two groups of reports were distinguished in these incidents in which alleged adverse effects were reported. One group containing 18 reports cited the involvement of simazine alone. The other contained 53 reports and cited simazine in combination with other ingredients. Humans were involved in 13 incidents in which simazine alone was cited as causing the alleged adverse effects. One person was hospitalized and 12 received medical attention in these incidents. Humans were involved in 43 incidents in which simazine was cited in combination with other ingredients. Nine people were hospitalized, more than 35 received medical attention and 412 were affected or involved and did not seek medical advice in these incidents.

Summary of science findings:

- Simazine is a moderate eye and dermal irritant with low oral and dermal toxicities. The available toxicity data are insufficient to fully assess the long-term chronic effects or the oncogenic, teratogenic, and mutagenic potential of simazine. The key data gap for most treated agricultural commodities is the simazine metabolites. Most established residue tolerances for raw agricultural commodities are expressed in terms of the parent compound only. Available data are insufficient to fully assess the environmental fate of simazine and the exposure of humans and nontarget organisms to simazine. The available simazine product chemistry data are insufficient to totally assess the chemical's characteristics. Simazine is not very toxic to nontarget insects, birds, or estuarine and marine organisms.

4. Summary of regulatory position and rationale

- All terrestrial use are RESTRICTED; all other uses are classified GENERAL.
- No major use, formulation, or geographical restrictions are required except for groundwater as addressed below.
- No unique warning statements, protective clothing requirements, nor reentry interval statements are required on the labeling; however, the labeling must bear the following groundwater contamination precautionary statements:

"Simazine is known to leach through soil and has been found in groundwater. Users are advised to apply this product only where groundwater contamination is unlikely. Do not apply in recharge areas of designated Sole Source Aquifers, or in areas with well-drained soils as defined by Class A of the Soil Conservation Service classification system which overlay shallow aquifers or which are not protected by an overlying impervious layer. Consult the proper state regulatory officials in your area for information on the location of sole source recharge areas, and the local agent of

the Soil Conservation Service for information on your specific soil characteristics."

- No risk assessments were conducted.

5. Summary of major data gaps and when these major data gaps are due to be filled

- The available product and residue chemistry data are insufficient to fully assess the chemical's characteristics. After receipt of guidance package, data must be submitted within 6 months for short term studies and within 4 years for long term studies. Long term studies include simazine and its metabolites in meat, milk, poultry, eggs and other commodities.
- The available toxicity data are insufficient to fully assess the long-term chronic effects and the oncogenic, teratogenic and mutagenic potential of simazine. Data gap also exists for a general metabolism study in mammalian species. These studies must be submitted within 4 years after receipt of guidance package.
- The following data are required to fully assess the environmental fate and transport of, and the potential exposure to simazine: (a) photo-degradation studies on soil and in water; (b) aerobic soil metabolism; (c) anaerobic and aerobic aquatic metabolism; (d) leaching and adsorption; (e) field dissipation studies: aquatic, forestry and long-term; (f) accumulation studies on rotational and irrigated crops. These studies must be submitted within the time periods indicated in Table A, Generic Data Requirements for Simazine, 158.130 Environmental Fate.

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